



- [54] **METHOD AND APPARATUS OF PULSED INJECTION FOR IMPROVED NOZZLE FLOW CONTROL**
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[57] **ABSTRACT**

An apparatus and method for varying the effective cross sectional area of an opening through a nozzle provides a controller **78** that pulses a fluidic cross flow through an injector associated with the nozzle **68** proximate to the opening of the nozzle. The controller **78** directs the injector **76** to provide a pulsed cross flow having a predetermined frequency, amplitude, or wave form. The pulsed cross flow interacts with a primary flow **14** through the nozzle **68** to partially block the nozzle's opening **72**, thereby effectively decreasing the cross sectional area of opening **72** in a jet engine **42**. A plurality of pulsed cross flows proximate to a nozzle's throat **70** permits effective afterburner **64** operations even with a fixed geometry nozzle by allowing throttling of the primary flow **14**. Further, variations in the cross flow's orientation pulse frequency, amplitude or wave form, or the cross flow's mass flow characteristics can allow vectoring of the primary flow **14**.

53 Claims, 3 Drawing Sheets

